Claims

1.   A method of determining the position of a mobile station in a satellite mobile telephone system, the method comprising the steps of:

        receiving propagation information from at least one satellite at a mobile station, the propagation information being sufficient to define two intersecting curves on the earth's surface; and

        processing the propagation information at the mobile station to identify the location of an intersection of said curves for determining the position of the mobile station.

2.   A method according to claim 1, wherein the propagation information is received from one satellite and comprises propagation time data and doppler shift data for the path between the satellite and the mobile station.

3.   A method according to claim 2, comprising the steps of:-
        (a)   calculating A as hereinbefore defined according to equation (6a);
        (f)   calculating B as hereinbefore defined according to equation (7a);
        (g)   calculating the latitude of the mobile station according to equation (8);
        (h)   calculating values for two possible longitude of the mobile station according to equation (9); and
        (i)   selecting one of the longitude values in dependence on the cell on which the mobile station is camped being east or west of the satellite's ground track.

4.   A method according to claim 3, including the steps of calculating satellite to mobile station propagation time (T_p) and doppler shift (f_d) according to equations (1) and (3) respectively.

5.   A method according to claim 1, wherein the propagation information is comprises propagation time data for the paths between the mobile station and the

satellites.

6.   A method according to claim 5, comprising the steps of:-

(a)   determining vector v as hereinbefore defined according to equation (15);

(d)   determining the co-ordinates of M as hereinbefore defined according to equations (17) and (18);

(e)   determining r as hereinbefore defined and a pair of co-ordinates for P as hereinbefore defined according to equations (21) and (19);

7.   A method according to claim 5, including the steps of:-

(a)   solving equation (25) for Z as hereinbefore defined;

(c)   determining X as hereinbefore defined and Y as hereinbefore defined for P as hereinbefore defined from $f(Z)$ as hereinbefore defined and $g(Z)$ as hereinbefore defined;

8.   A method according to claim 6 or 7, including the steps of converting the cartesian co-ordinates of P into longitude and latitude according to equations (22) and (23), and selecting one of the longitude and latitude value pairs produced on the basis of the identity of the cell on which the mobile station is camped.

9.   A method according to claim 6, 7 or 8, including the step of determining T_{p1} as hereinbefore defined and T_{p2} as hereinbefore defined.

10.   A mobile station for a satellite mobile telephone system including transmitting means, receiving means and a controller configured for operation in a method according to any preceding claim.